WHAT HAPPENS TO VEHICLE ELECTRONIC SYSTEMS WHEN THE BATTERY IS DISCONNECTED

When the first battery cable, the ground cable, is disconnected from the battery, the two problems that result are a loss of computer memory and voltage spikes that could damage computer memories. Both problems can be prevented by installing a spare battery system to the vehicle when changing the batteries in the vehicle.

Loss of Computer Memories:
Disconnecting the negative cable breaks the vehicle's electrical circuit and powers down HOT-AT-ALL-TIME memory circuits which erases memory information stored in some of the on-board computers. This would cause the loss of valuable stored diagnostic information and should be prevented if this information is required for other service work or historical purposes of the vehicle.

Voltage Spikes:
Voltage spikes at the negative battery terminal should be minimized or eliminated when the negative cable is first disconnected. Voltage spikes are caused by stored electrical energy in HOT-AT-ALL-TIME circuits being released as the circuits power down. It is seen as arcing at the negative terminal. The sudden energy release jumps across the negative cable connection when the negative cable breaks away from the negative terminal (arc jumps the gap).

The same thing happens when the negative cable reconnects to the negative terminal. A surge of electricity enters the vehicle electrical system to power up HOT-AT-ALL-TIME circuits.

The voltage spikes are like "arcs and sparks" that send current surges through the electrical system. The surges can damage sensitive electronic memory circuits even when the ignition key is off. In some cases it may even alter stored memory information, such as the total odometer mileage read out on a digital dash.

A spare battery connected to the vehicle's electrical system keeps computer memories alive and eliminates voltage surges. The spare battery provides voltage to keep circuits powered up when the vehicle batteries are removed. The following covers most of the common vehicle computer scenarios.

A. ENGINE COMPUTERS:

1. STORED DIAGNOSTIC CODES IN MEMORY: Lost when battery is disconnected. Therefore, before disconnecting battery's negative cable retrieve diagnostic codes and write them down on the repair order for future reference. You may need to know the past diagnostic history for future maintenance needs.

2. ADAPTIVE FUEL DELIVERY MEMORY: Lost when battery is disconnected. This is the engine computer's ability to adjust fuel delivery rates for different driving conditions; idle, accel, W.O.T., etc. It is the computer's way to maintain a fuel ratio of 14.7:1. It can also compensate for minor vacuum leaks (lean condition) and leaking fuel injectors (rich condition). The vehicle may exhibit a slight difference in drivability until adaptive fuel delivery is relearned. It takes about 50-100 miles of normal driving for the memory to restore to the previous fuel delivery rates.

3. FUEL RATE CONSUMPTION MEMORY: Lost when battery is disconnected. Fuel Rate is a measure of the vehicle's use of fuel to operate so performance and economy can be judged. It can also be used to compute "RANGE" information (miles left to drive on remaining fuel) on vehicles equipped with FUEL RANGE DISPLAYS. They are available on some digital dashes or driver information panels. Range displays will read blank or all zeros after battery is replaced until information is relearned by the engine computer in about 25-50 miles of normal driving.

4. SPECIAL CIRCUIT MEMORIES: Some engine computers store idle speed information in the form of a idle air valve setting. This memory information is erased when the battery is disconnected, and the vehicle will not idle properly when restarted. Simply running the vehicle for several minutes at 1500-2000 rpms will allow the computer to re-calculate the idle setting. This restores the vehicle to normal operation. Do not attempt to set idle speed to correct the problem. Allow the computer time to restore its idle setting memory circuit.

B. VEHICLE SYSTEM COMPUTERS:

Any vehicle system can be controlled by a computer, such as, engine cooling fans, the charging voltage, automatic headlight dimming, electronic message centers, trip computers, air-conditioning, to name just a few. It is estimated that by the year 2000 some vehicles could have as many as 54 separate computers. All have two common problems.

Problem #1: These computers have their own memory circuits to store data, vehicle operational parameters and diagnostic information. Removing the battery system from the vehicle will power down these computers and cause a loss of stored memory information. The memories should be kept alive with a spare battery system if their stored data is to be maintained. If memory is lost, some computers will require reprogramming.

Problem #2: Voltage spikes occur at the battery terminals as the ground (negative) cable is removed. Permanent damage to computer memories could result, requiring replacement of the computer.